with ordinary unground wheat bran, viz., for protein 28.0 per cent. and for carbohydrates 55.5 per cent. and the other quoted experiments on graham, whole wheat flours and straight flours where greater or less amounts of the branny coatings were present, it seems perfectly safe to assert that the digestibility of the combined branny coatings of the wheat berry is even lower than the figures quoted. If we may assume, for example, that average commercial bran contains 14 per cent. protein and consists of 15 per cent. flour cells and 85 per cent. branny coats and that average straight flour has 11.5 per cent. protein, 2.1 per cent. of the bran is flour protein and 11.9 per cent. bran protein. If it is fair to apply to the flour protein, the average coefficient of protein digestibility—90.9 per cent. found in white flour digestion experiments,[4] 1.91 per cent. of the bran is digested from the flour protein and since but 3.92 per cent. of the total protein is digested, the balance or 2.01 per cent. represents the digestible protein derived from the bran coats only. The digestibility of the protein of the branny covering of the wheat grain is therefore about 16.8 per cent.

In the absence of data on the digestibility of ground husks and pulverized nut shells, it is perhaps no exaggeration to assert that as far as the digestibility in the human stomach of the branny portion of the wheat grain is concerned, bran must be considered as not much more nutritious or desirable than pulverized nut shells would be.

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THE INTRODUCTORY COURSE IN ZOOLOGY

IT has been of especial interest to those of us in the University of Missouri who have taken part in the presentation of the introductory course in zoology to read the recent discussion in SCIENCE by Professor Bradley M. Davis[1] and Professor A. Franklin Shull,[2] because the type of course advocated by both is exactly the kind of elementary course that has been given here for nearly twenty years. It is, therefore, extremely gratifying to us to note the tendency that is beginning to manifest itself, as a result of the readjustment from war conditions, in respect to the introductory teaching of botany and zoology in our colleges and universities, and it is our earnest hope that it will not be long before the old type course will have been abandoned everywhere and its place taken by the more significant course based upon fundamental principles.

We have been attempting to do for a long time exactly what Professor Davis expresses as his hope for the future—"nothing more than the grounding of fundamental principles and a selection of information with rather definite reference to its general and practical interests, or its broad philosophical bearing," and Professor Shull's description of the first course in zoology, as it has been given in the University of Michigan for several years, applies in all essential respects to ours.

In no sense has our introductory course been one based upon the study of types, and never has it been dominated by anatomy. It has been our strong conviction that such a course fails utterly, from an educational point of view, in affording an adequate introduction to the study of zoological science. A thorough study of a single animal and studies in comparative morphology and in taxonomy belong, we have always held, to the more advanced and specialized courses designed for students who have an interest in the further pursuit of zoological knowledge, and not to the introductory course.

Long ago we recognized the obvious fact that the great majority of students who take our course in general zoology will receive no further biological training, and, therefore, our efforts have been directed toward giving it

[4] Page 6, U. S. Dept. of Agriculture, Bulletin No. 751.

[1] SCIENCE, N. S., Vol. 48, November 22, 1918, pp. 514–515.

[2] SCIENCE, N. S., Vol. 48, December 27, 1918, pp. 648–649.

significance as a factor in a general education. Throughout the course, the fundamental value of biological science to human welfare is emphasized, and no opportunity is lost to apply biological principles to the life of man. The broad, philosophical bearing of these principles is in no wise impaired by an appeal to practical interests, where such an appeal can be legitimately made.

This is the spirit behind the regulation of our college of arts and science which requires of all its students for graduation the introductory course in either botany or zoology. It seems self-evident to us that a type course does not and can not fulfill such a purpose.

General principles, not phyla and classes, furnish the *points d'appui* on which we attempt to build up both the lectures and the work of the laboratory. The animals that are used in the laboratory are studied not as representatives of groups, but rather as sample animals, convenient forms for observation and suitable for illustrating principles. Structure is never divorced from function in the instruction, and anatomical facts that fall within the scope of the course are not presented as of interest *per se*, but only as bearing upon general principles or as having some useful application.

The course is based upon the following fundamental aspects of zoological science, no one of which is unduly emphasized or slighted: (1) The organization of animals, both structural and functional; (2) the relation of animals to their environment, both general and specific (including economic considerations and relation of animals to disease); (3) the origin of the individual; and (4) the relation between successive generations of animals.

The several sections of the class are under the direction of different instructors, and each man is free to work out his own method of presentation of facts and their application to principles, but the final result and the spirit and the purpose of the course are the same throughout, although it may happen that the end is reached by somewhat different methods and arrangements of material.

The following outline, while not attempting to set forth details, fairly well represents the general scope and nature of our introductory course.

I. Introduction. *Lectures:* (1) Definitions; scope and position of zoology among the sciences; historical background of zoological science; (2) fundamental aspects of zoology; (3) protoplasm and its properties; (4) fundamental structure and functions of animals—the cell as the unit of structure and function.

II. The Organ-Systems and Their Functions. (A) *Lectures:* Based on the laboratory work on the frog, with reference, however, to other forms, including man; foods and the principles of nutrition are emphasized. (B) *Laboratory work:* The study of the organs of the frog and their functions, with numerous demonstrations and simple experiments. The concept of the animal as a cellular organism, as well as that of cell-differentiation, is built up through a study of tissues, both macerated and in section, of the frog and other animals.

III. Relations to Environment. (A) *Lectures:* General ecological relations; adaptations, behavior, etc., with special reference to the frog. (B) *Laboratory work:* Observations and experiments on the frog and other forms.

IV. The Protozoa. (A) *Lectures:* General characteristics; structure; functions, including reactions and reproduction; relations to environment; relation to disease. (B) *Laboratory work:* Study of *Amœba, Euglena, Paramœcium,* Gregarines; observations and experiments to illustrate general principles; demonstrations of pathogenic protozoa and other unicellular organisms.

V. Hydra. (A) *Lectures:* The study of *Hydra* as a simple metazoon and the beginning of cell-differentiation. Reproduction in the Cœlenterata. (B) *Laboratory work:* The study of *Hydra* and a hydroid colony. Demonstration of other Cœlenterates.

VI. Insects. (A) *Lectures:* Structure; life-histories; adaptations; habits and social relations; parasitism; insects as carriers of pathogenic organisms. (B) *Laboratory work:* The study of the grasshopper, and comparison with representatives of other orders. Numerous demonstrations illustrating protective coloration, mimicry, and other ecological re-

lations. Demonstrations of parasitic insects and other animal parasites, with explanation of relation to hosts.

VII. ONTOGENY. (A) *Lectures:* The general principles of reproduction and development. (B) *Laboratory work:* The study of the development of the frog, and comparison with other forms. Demonstrations of mitosis, germ-cells, chromosomes, fertilization; chick embryos and their nutritive mechanism; mammalian embryos and their relation to the placenta.

VIII. PRINCIPLES OF GENETICS. (A) *Lectures:* (1) Essentials of Mendelian heredity; (2) mechanism of heredity. (B) *Laboratory work:* Demonstrations of living and preserved material illustrating Mendelian principles.

IX. PRINCIPLES OF ORGANIC EVOLUTION. (A) *Lectures:* (1) Sources of evidence for evolutional change; (2) the method of evolution, with brief historical account and a discussion in the light of recent knowledge of the manner in which evolutional change takes place. (B) *Laboratory work:* Demonstrations of fluctuations, mutations, etc. Demonstrations of paleontological material, both fossils and models.

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SCIENTIFIC EVENTS

CHANGES IN THE FRENCH POPULATION IN 1918

THE minister of labor has completed the birth and mortality statistics for France for the year 1918. According to the Paris correspondent of the *Journal* of the American Medical Association the statistics show that the civil population of France decreased during the year 1918 by 389,575, not counting the war losses. The statistics, based on civil records, continue to cover only the seventy-seven departments that were not directly affected by military operations. This is the same as it was during the first four years of the war. It will be the same for the year 1919, and not until the beginning of 1920 will the statistics of all French territory, made complete by accession of Alsace and Lorraine, be included. If one compares the statistics of the years 1917 and 1918, for the seventy-seven departments of which account was taken, one will note that last year shows not only the persistance of an excess of deaths over births, but even an increase of the excess over that of the preceding year. In 1917, the population of the seventy-seven departments not invaded decreased 268,838, whereas the decrease in 1918 has risen to 389,575. This result is due to the considerable increase in the number of deaths during the second half of 1918, ascribable to the influenza epidemic; for the number of births showed a slight increase over 1917. A comparison of the statistics of the years 1917 and 1918 is given in the accompanying table:

	1918	1917
Births	399,041	343,310
Deaths	788,616	613,148
Excess of deaths over births	389,575	269,838
Marriages	177,872	158,508
Divorces	8,121	5,572

An analysis of the table reveals the fact that in 1918 there was: (1) an increase in the number of marriages; (2) a corresponding increase in the number of births, and (3) an increase in the number of deaths. This increase in mortality affects exclusively the second half of last year. During the first half of 1918, 316,077 deaths were recorded, as compared with 354,554 during the first half of 1917; and during the second half of 1918, 472,539 deaths were registered, as against 258,594 in 1917. According to the preceding figures, the number of civil victims claimed by the influenza last year may be placed at approximately 200,000.

A PUEBLO RUIN IN NEW MEXICO

THREE years ago Earl H. Morris, representing the American Museum of Natural History, undertook the excavation of an ancient Pueblo ruin in Astec, New Mexico. The work was begun at the suggestion and through the courtesy of the H. D. Abrams, the owner of the property, and is being financed from the Archer M. Huntington fund for surveying the southwestern United States. During the past month the museum party has uncovered a new section of the ruin revealing several rooms filled with sand and